Accounting for Attractions When a Solid Dissolves

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

Two solids dissolve in separate insulated model cups. The display tracks energy associated with changing attractions separately from thermal energy in the cups. A positive attraction-energy change takes energy from thermal motion. A negative change adds energy to thermal motion. No energy enters or leaves the cups.

Trial	Separating solid particles	Separating liquid particles	Forming new attractions
P	+12	+8	−18
Q	+15	+5	−23

1 Which listed step gives energy out in both trials?

(1) Separating the solid particles

(2) Separating the liquid particles

(3) Forming new attractions

(4) Every listed step

2 Calculate the net energy change associated with the attractions in each trial. [1]

Answer and work

3 A student predicts that both mixtures cool because both require energy to separate the particles. Use the complete records to evaluate the claim. [1]

Answer and work

A new model repeats P with the same separation readings. Its formation step now releases 20 units.

4 Predict the repeat’s net energy change associated with attractions. Explain why the two separation readings alone cannot give it. [1]

Answer and work

In the repeat, the temperature stays steady and a separate particle detector shows that the solid has dispersed into the liquid.

5 Explain how the solid can dissolve even while the measured temperature stays steady. [1]

Answer and work